

REMARKS

The Office Action mailed June 17, 2004, has been carefully considered. Reconsideration in view of the following remarks is respectfully requested.

The First 35 U.S.C. 103(a) Rejection

Claims 15-20, 25 and 40 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Genov et al (USP 5,064,340) in view of Reynolds et al. (USP 5,547,537). The Examiner's grounds for rejection are hereinafter traversed, and reconsideration is respectfully requested.

The present invention makes use of the concept of using extended positions of two levers with respect to each other for reducing positional errors of the chip gripper. This concept is not known from the prior art. Neither Genov alone nor the Genov and Reynolds references in combination teach or suggest the use of this concept. Claims 15 and 40 distinguish from the Genov as well as from the combination of the Genov and Reynolds references.

The patent of Genov (US 5,064,340) concerns a precision arm mechanism which will extend and retract in a straight line and is suitable for positioning various objects such as semiconductor wafers, computer hard discs, and the like for processing and/or use (column 1, line 5 to 10). This arm mechanism is not suitable for picking semiconductor chips from a wafer table and placing them on a substrate because semiconductor chips must be processed with very high speed for achieving a high throughput of the machine whereas objects like semiconductor wafers and computer hard discs can only be processed with comparatively low speed. The heavier masses of semiconductor wafers and computer hard discs do not allow the high accelerations that must be applied to semiconductor chips when they are mounted.

Applicant respectfully maintains that the Genov reference is not analogous art. Genov, which discloses a precision arm mechanism for positioning various objects, is not from the same field of endeavor as an apparatus for placing semiconductor chips on a substrate, as recited in claims 15 and 40 of the present application. The size of a semiconductor chip varies from fractions of a millimeter to two to three centimeters. The size of semiconductor wafers amounts up to 12 inch. The areas of placing semiconductor chips on a substrate and positioning big and heavy objects are unrelated. Therefore, one of ordinary skill in the art would have no motivation or occasion to consider the Genov reference.

In order for art outside of the same field of endeavor to be considered analogous art, the art must be reasonably pertinent to the particular problems with which the inventor is concerned. The particular problems are listed in the section headed "background art" on pages 2 and 3 of the present application. The problems to solve are achieving precise placements at high speeds whereby the tendency of the levers for vibration must be eliminated. As recited in the specification, the pick and place mechanism must, ensure accurate positioning of the chip gripper in both end positions, but along with this also make possible rapid back and forth movements, that is to say short cycle times. So high speeds and short cycle times of the movement sequences are required, which cause correspondingly high accelerations and inertial forces to occur on the parts moved. Genov discloses a precision arm mechanism for positioning objects which are much bigger and heavier than semiconductor chips. Therefore Genov is not reasonably pertinent to the particular problems of high accelerations and inertial forces occurring on the relatively small semiconductor chips. Therefore there is no motivation to modify the precision arm mechanism of Genov such that it can be used for mounting semiconductor chips.

There is no reason or suggestion for combining the Reynolds (US 5,547,537) and the Genov reference in order to obtain the present invention as recited in claims 15 and 40. As illustrated above Genov is non-analogous art and does not concern the field of positioning small and light objects at high speeds. The combination of the Genov and Reynolds references is improperly grounded in hindsight reconstruction based on the disclosure of the present application. This practice is not permissible. The prior art cited against a patent application must be viewed without reading the application's teachings into the references. When prior art references must be selectively combined, as done here by the Examiner, to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. Such a reason is lacking in this situation.

While the combination of the Genov and Reynolds references includes a chip gripper, a wafer table and a displacement means, the combination still fails

- to disclose the concept and advantage of using extended positions of two levers with respect to each other for reducing positional errors;
- to disclose a predetermined gear ratio defined by the formula $n=360^\circ/\Phi$;
- to disclose a swiveling of its levers between two defined positions, where the angle of rotation of the first lever is defined by a fixed angle Φ .

Furthermore if the combination of the Genov and Reynolds references would be modified according to the teaching of the present invention for overcoming these missing properties the resulting apparatus would have lost the essential property of the precision arm mechanism of Genov, namely its ability to perform the so-called r-motion. i.e. moving the chip gripper along a straight line without changing its orientation with regard to the straight line. For achieving this

Genov discloses a first arm having a first, second and third link and an end effector which are rotated about a first, second, third and fourth axis, respectively, at a rotation ratio of the first axis to the second axis to the third axis to the fourth axis of 1:2:2:1 (column 4, lines 15 to 19). Genov discloses a second arm having a first and second link and an end effector which are rotated about a first, second and third axis, respectively, at a rotation ratio of the first axis to the second axis to the third axis of 1:2:1 (column 4, lines 20 to 51). The rotation ratio must not be modified. So the use of the predetermined gear ratio defined by the formula $n=360^\circ/\Phi$ is not just discovering an optimum value of a result effective variable as there is no such variable. It is the result of the concept of using extended positions of two levers with respect to each other for reducing positional errors which concept is not known from either of the two references.

The Second 35 U.S.C. 103(a) Rejection

Claims 21-24 and 26-39 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Genov, et al. (USP 5,064,340) in view of Parker (USP 5,934,147).

Applicant has demonstrated above why the independent claims upon which claims 21-24 and 26-39 are based are allowable. Accordingly, these claims are allowable as well.

Conclusion

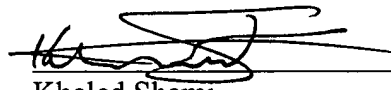
In view of the preceding discussion, Applicants respectfully urge that the claims of the present application define patentable subject matter and should be passed to allowance. Such allowance is respectfully solicited.

If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney at the number below.

Please charge any additional required fee, including those necessary to obtain extensions of time to render timely the filing of the instant Reply, or credit any overpayment not otherwise paid or credited, to our deposit account No. 50-1698.

Respectfully submitted,
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